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DEPARTMENT OF THE INTERIOR

Minister

W. W. Cory, C.M.G., *Deputy Minister*

WEST TERRITORIES AND YUKON BRANCH

O. S. Finnie, *Director*

CORONATION GULF COPPER DEPOSITS

Report of an Inspection of the Known Mineralized Areas
in Coronation Gulf and Bathurst
Inlet Districts

1928-29



Ottawa

F. A. ACLAND

Printer to the King's Most Excellent Majesty

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BY
MAJOR L. T. BURWASH, M.E., F.R.G.S.



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Coronation Gulf Copper Deposits

By L. T. Burwash, M.E., F.R.G.S.

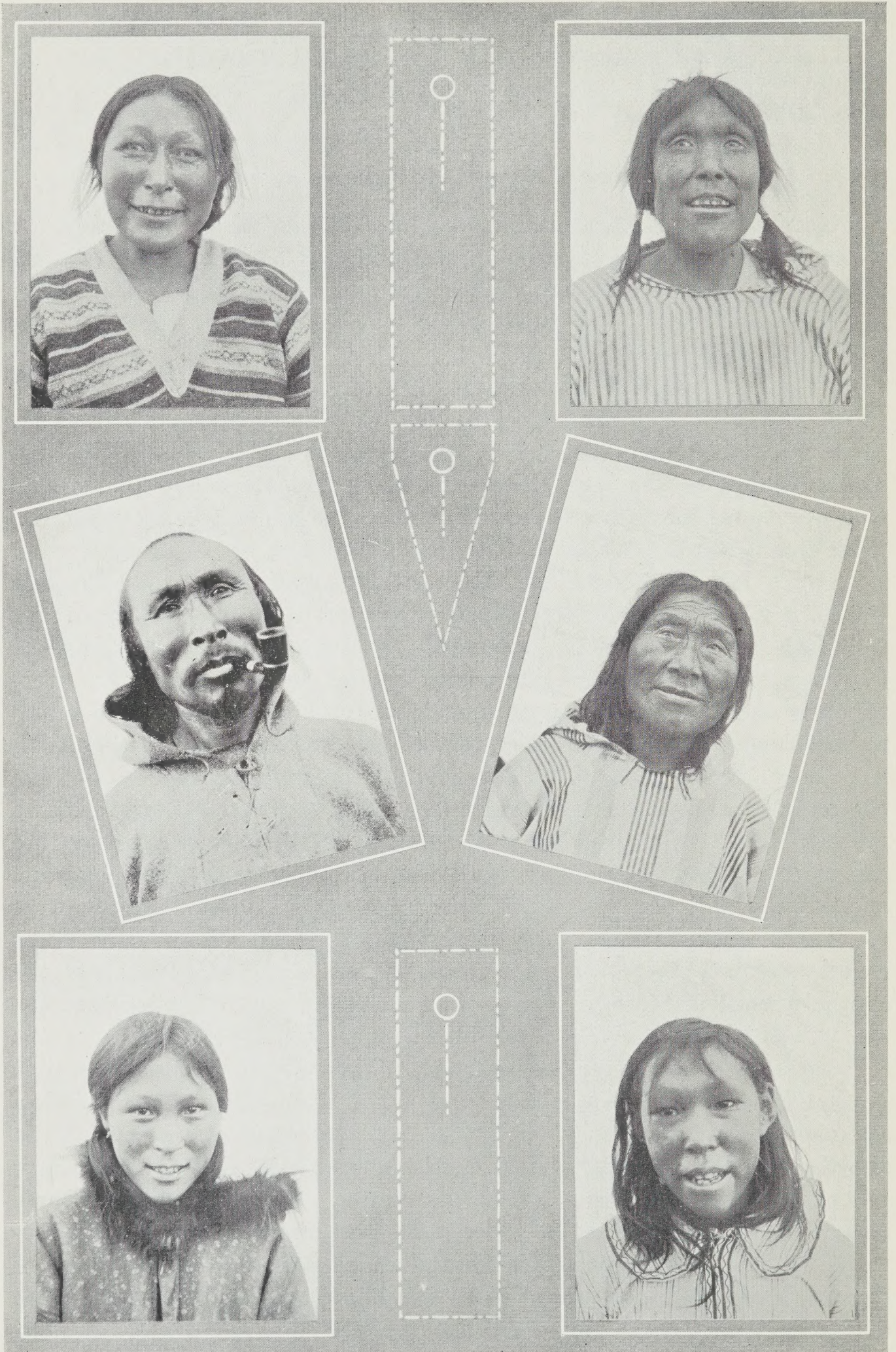
THE JOURNEY TO THE NORTH

During June, 1928, the writer received instructions to proceed to the western Arctic by way of Edmonton, Alberta, and Aklavik, N.W.T., and when in the vicinities of King William island, cape Adelaide, Back river and Wager inlet to investigate certain problems relating to native life, navigation and transportation.

Edmonton was left during mid-July and Aklavik, in the delta of the Mackenzie river, was reached at the end of that month. At this latter point the departmental schooner *Ptarmigan* was taken over and the trip was continued to the eastward. On leaving Aklavik a load of thirteen tons of general supplies was stowed aboard, this amount being somewhat of an overload for a schooner of the size employed.

Sixty days elapsed before Gjoa, on the southeast of King William island, the proposed winter camp site, was reached, many days having been lost through storms and impossible ice conditions. From August 14 to 20 a violent storm drove every craft on Beaufort sea to shelter. Fortunately the *Ptarmigan* was at anchor in the harbour at Baillie island when this storm developed, but even within the harbours the conditions were such that several schooners were driven aground and some were completely wrecked. The second major delay occurred in attempting to proceed from Cambridge bay to King William island. On this venture the more northerly route was taken. In the vicinity of Stromness bay and Lind island a heavy ice barrier was encountered and ten days were spent in a fruitless effort to find a passage eastward. Eventually it was found necessary to return to Cambridge bay and then to follow the southern coast of Queen Maud gulf to Simpson strait. During this trip heavy weather and ice floes delayed the expedition considerably.

Arriving at Gjoa on the last day of September the schooner was hauled ashore and a winter base was established. The nearest wireless station communicating with civilization was located at Oscar Bay on the western coast of Boothia peninsula, where the Hudson's Bay Company's schooner *Fort James* was spending the winter. During the winter three trips were made to this point and reports were forwarded to the Department by wireless. Cape Adelaide and other points in the vicinity of the north magnetic pole were visited and observations were taken. Two days were spent on the area which may be classed as the site of the magnetic pole.



1. Native types, Cambridge Bay.

In passing, it may be remarked that the country immediately surrounding the magnetic pole is anything but magnetic in appearance. Ashore, little is to be seen but an uninteresting view of flats composed of glacial clay and broken limestone unrelieved by vegetation and unbroken by elevations rising more than a few feet. To seaward, the ice stretches to the horizon, any islands that may exist being hidden by hummocks. No heavy ice action was seen in this area during the past season, although it has a reputation for very heavy pressure ridges and bad ice conditions, both in winter and summer.

On the occasion of the last visit to the Oscar Bay wireless station instructions were received to drop the proposed investigation of a freight route from Wager inlet to Back river and to substitute an examination of the known copper areas of Coronation gulf.

THE MINERALIZED AREAS

Acting under these instructions, the winter camp at Gjoa (south-east King William island) was abandoned on May 17, 1929. The weather being clear and very bright, the start was delayed until 7 p.m. as for several weeks prior to the above mentioned date much trouble from snow blindness had been encountered.

During the winter of 1928-29 the dog market was at its lowest ebb, the Arctic dog sickness having recurred during each winter since 1926. No team for the trip through to Cambridge Bay could be secured so it was decided to stage through from one Eskimo camp to the next, a somewhat risky experiment, but no alternative presented itself.

The first stage, Gjoa to Simpson strait, was made in fourteen hours without incident other than the meeting with two Eskimos who carried the one winter mail to reach King William island during the year. A number of letters were received, the latest dated November, 1928. No departmental mail was in this budget.

In two short stages during which five small dog teams were used, Etanik island was reached. This island was, or had been, the sealing headquarters for the eastern end of Queen Maud gulf, but only deserted igloos welcomed our party on May 20. A camp was built for the night and next morning a native trail to the northwest was followed, two light sleds being used, and the loads brought from Gjoa left cached at our camp. A fairly large Eskimo camp was sighted after thirty miles of fast travel. The Eskimos gave the party a warm welcome and a most acceptable meal consisting of seal stew, hardtack, caribou fat (frozen) and tea, after which successful negotiations were made for a sled and eight dogs with which to continue the trip to Perry River post. One of the Eskimo boys from Sherman inlet developed a bad attack of snow blind-

ness and it was necessary to leave him with the other natives at this point. A return to Etanik island was made without sleeping, nineteen hours having been taken on the round trip.

Two Eskimos with their eight dogs were used on the Etanik-Perry River stage and all went well until the outer islands, twenty-five miles north of the mouth of Perry river, were reached. During the night two dogs deserted, having apparently taken the homeward trail. The trail of an Eskimo seal hunter was seen close to our camp, so it was decided that one of my Eskimos (Ooksuk) should spend the day sealing while the other (Koodlookta) and I followed the local hunter's trail to his camp, which could not be far away. This decision was arrived at for several reasons—more dog feed would be acceptable, the exact location of the Perry River settlement was uncertain and our stray dogs might return to camp within twenty-four hours. The trip to the seal hunter's camp was more of an undertaking than had been anticipated and when the camp was finally reached it had been deserted.

Returning to camp it was found that Ooksuk had spent his day sleeping instead of sealing but he undertook to make a seal hunt during the night while we slept. Next morning we discovered that during the night Ooksuk had taken four more of the dogs and, apparently, had returned to his home.

It was impossible to move our large sled and the load with the two remaining dogs, so nothing remained but to leave everything and proceed to Perry River on foot. At Perry River, which was reached after seven hours' walk, a few natives were found with but one dog team among them. They were most hospitable, giving us food and a place to sleep but when approached on the question of coming to Cambridge Bay they pointed out that this was quite impossible as they were on the point of starting inland on their spring caribou hunt which, on account of the advance of spring, could not be long delayed. They agreed, however, to go to our camp and bring the outfit to Perry River. Two young Eskimos, accompanied by Koodlookta, started the following day and returned with the outfit a day later. During the trip Koodlookta developed snow blindness so a further delay at Perry River was necessary. Arrangements were made to secure a small light sled and permission was secured to cache the larger part of our load in a small iron warehouse owned by a native. On the evening of May 31 the trip was resumed with a light camp outfit, cameras and a limited stock of films loaded on a five-foot sled.

The trip from Perry River to Cambridge Bay is, under the most favourable circumstances, considered a four-day journey, the distance being 150 miles, but in spite of our limited transport we arrived there only one day behind schedule. Several days were spent at Cambridge Bay arranging for the next stage (Cambridge Bay to Wilmot island). A



2. Native types, Cambridge Bay.

Hudson's Bay Company's team was secured, to which Koodlookta's two dogs were added. It had been Koodlookta's intention to return from Cambridge Bay to his home in the east, but an Eskimo is nervous when travelling alone, especially late in the season when difficulties are almost certain to be met. It was therefore decided to retain his services for the summer as native help would always be necessary and Koodlookta had proven himself exceptionally capable.

Five days later, during the last two of which travel had been through from one to two feet of water lying on top of the salt ice, Wilmot island was reached. At this point is the headquarters of Mr. Patsy Klingenberg, the well known Arctic trader who can always be depended upon to assist white men or natives to the best of his ability, but when his home was reached (on June 16) he had gone south with his dogs to the Canalska post, fifty miles down Bathurst inlet, and did not return until twelve days later. By that date travel on the ice had become almost impossible, so nothing remained but to await open water. This was however not entirely unfortunate as the northeastern extremity of the mineralized area of Bathurst inlet had been reached and while the season was not the best for our work, it was possible by use of a combination of sled and canvas boat to look over much of the northern section of this area. The results of these observations are given in the latter part of this report.

At the time of our arrival at Wilmot island the snow was almost entirely gone from the land and the sea ice was to a large extent covered by water. On June 20 the weather changed. A strong southeast gale developed which was accompanied by heavy snow. By the 21st the temperature had fallen well below freezing and as the gale increased, a blizzard of no mean proportions developed which lasted until the night of the 22nd when the weather again became normal and the snow which then covered the country to a depth of about two feet quickly disappeared. It was during this storm that a young Scotchman named Ian McKay Christie lost his life in this locality. The land was again free of snow by the 27th and from that date until the 12th of July many trips were made over the islands to the north and south.

From July 12 until the 26th upon which date it was possible to leave the island by schooner, no work could be done. On July 25 the Canalska schooner *Nigalik* arrived from Bathurst inlet and remained for the night in the harbour. The *Nigalik* had been within sight throughout the whole of the 25th but it required fifteen hours to work through the ice from her last anchorage on Lewis island, though the distance travelled was only fifteen miles. The crew of the *Nigalik* reported that they had spent a week breaking their way from Bathurst Inlet post, a distance of about fifty miles.

At 10.30 a.m. on the 27th the *Nigalik* sailed for Bernard Harbour, taking a course somewhat west of north in an attempt to reach open water north of the Jameson islands. At 2.30 the same day Klingenberg left in his schooner, the *Nauya*, for Kugaryuak, a Hudson's Bay Co. post fifty miles east of the mouth of Coppermine river, with Koodlookta and myself on board. An attempt was made to follow the course taken by the *Nigalik* but floes which she, a much heavier boat than the *Nauya*, had penetrated, turned us to the west and later almost due south. By 4.30 p.m. ice which could not be navigated was reached and the anchor was dropped until conditions improved.

At 8.30 p.m. a change of tide slackened the ice and it was found possible to work through the floes as far as a small island lying fifteen miles westerly from Wilmot island. It was upon this island that Klingenberg's schooner, the *Dr. Rimer*, was wrecked during August, 1928, so a stop was made to secure ninety gallons of gasolene which had been salvaged after the wreck. During the time spent on this operation the ice again closed in and it was not until 8 a.m. on the 28th that it was possible to continue the journey. Two hours' strenuous and somewhat hazardous work brought the schooner into a fair lead which gave an open channel to cape Barrow. It was found that the ice had injured the rudder and a two-hour stop was made to effect temporary repairs. As the members of the party had not slept since leaving home all hands turned in until 10.30 p.m. A crossing to the most westerly of the Jameson islands was made under conditions none too favourable but upon attempting to proceed to the westward a solid barrier of ice was encountered.

The party landed on the westerly of the Jameson islands, which is a tableland several hundred feet high, and climbed to the high ground to observe the ice conditions to the westward. A few minutes were enough to satisfy everyone that further progress was impossible until wind or tide moved the floes lying west and north. By 1.30 p.m. on the 29th the ice loosened and three hours' sail brought the schooner abreast of Hepburn island. From this point to Kugaryuak small open leads were found which followed a general westerly course, but which led the schooner much farther north than was desired, the route followed being twelve miles off shore when Tree River post was passed.

Upon reaching Kugaryuak, Koodlookta and I went ashore as the schooner *Nauya* was proceeding to Bernard Harbour. Kugaryuak is a small river at the mouth of which trading posts have been established by the Hudson's Bay Company and Watson & Craig. It is from this point that the natives when travelling inland leave the coast as the valley of the Kugaryuak affords the best route to the interior.

On July 30 a gasolene boat was secured from the Hudson's Bay Company and at 3 p.m. our trip was continued towards Coppermine, a



3. Mr. Patsy Klingenberg, his family and trading post, Wilmot Island.

second native named Luke, who was familiar with the boat's engine, having joined the party. Much ice was encountered for some miles west of Kugaryuak but the gulf was clear for twenty miles east of Coppermine. At 8 a.m. on the 31st the settlement at the mouth of the Coppermine was reached. The site and the buildings at this point are probably the best along the Western Arctic coast, and the river produces a plentiful supply of high grade fish. The fishery is quite as important as the fur post, as not only are many salmon dried and exported to other company posts, but here many dogs are bred for distribution along the coast.

THE COPPERMINE MINERAL AREA

Heavy rains fell on the morning of August first but slackened somewhat towards evening. Leaving the Hudson's Bay post at 7 p.m., Bloody falls was reached three hours later. This trip was made in a smaller motor boat secured from Mr. Barnes of the Hudson's Bay Company.

At Bloody falls, nine Eskimo camps were found which housed about fifty persons in all. These people were engaged in fishing and were being well repaid for their efforts. The fish taken in excess of their immediate needs were being dried for winter use.

For the trip inland I engaged three natives, in addition to Koodlookta, and arranged to leave for the interior next morning, August 2. It may here be mentioned that Bloody falls is not a "fall" as generally understood, but a crooked canyon with a heavy current throughout its length of one and three-quarter miles.

On the morning of August 2 four natives and I, accompanied by two pack dogs, started inland, our primary objective being the placer copper areas known to the natives. On this trip it was necessary to carry a tent, mosquito bars and light blankets, but it was decided to leave the fuel supply to chance, a decision which lightened packs materially and caused us no inconvenience later as the willows and bracken proved adequate for our needs. A long day's march in a southerly direction was made. Our trail occasionally followed close to the western bank of the Coppermine river, but more often paralleled it at some miles distant. The country consisted of wide grassy valleys separated by abrupt basaltic ridges. Fairly well developed willows grow in the protected areas. After a fourteen-hour day, camp was pitched on the southerly face of a low ridge, a short distance north of Husky creek and five miles west of the river. As the natives reported that the first of the areas from which they had frequently gathered copper lay in the valley immediately in front of us, it was decided to make this the site of our base for the time being.

August 3 was spent in the examination of two areas from which the Eskimos have for generations secured native copper for their needs. The first area lies one mile south of Husky creek and here there is one nugget

of native copper weighing approximately 600 pounds and fine copper scales mixed through the soil in its immediate vicinity. This deposit, which is manifestly the result of glacial action, lies in a grass-covered flat, the soil being a mixture of clay and sand. In addition to the copper, well-worn glacial drift, made up of rocks indigenous to the immediate country, occurs. The showings at this point cannot be considered as more than indications of deposits of copper in place in the area but at some distance from the specimens seen. Both the copper and rock in the showing are much worn and have travelled many miles before being deposited in their present location. The second area examined lies about eight miles farther west and consists of smaller specimens of copper (pieces up to fifteen pounds have been found), but the samples occur more frequently and are spread over a greater radius than in the first area. This deposit has also been built by glacial action and from the appearance of the glacial drift both copper and rock may easily have the same source as those of the first area. From the second area a course was taken in a northerly direction across wide flats to a small range of hills some ten miles distant. These were examined, but, although the geology is similar to that of the country to the south, nothing indicating the proximity of copper was seen. Camp was reached at the close of a nineteen-hour day.

August 4 was spent in an examination of the country north and west of the camp where the geology was found to be similar to the other areas visited, but no special mineralization was seen. About twenty miles of country was traversed.

On the 5th, the camp was moved back to the foot of Bloody falls, the route followed lying about ten miles west of Coppermine river until the barrier forming Bloody falls was reached. This was then followed eastward to the campsite at the foot of the falls.

August 6 was spent working along the hills to the east of Bloody falls where the geology was found to be much the same as seen in other areas, the only variation being a series of steep clay hills which rise to about three hundred feet above the valleys. No promising mineralization was seen on this trip.

On the 7th the camp was sent to the Hudson's Bay Company's post by canoe, while Koodlookta and I walked across country. The area crossed is much lower than above the falls, with infrequent exposures of rock in place, the larger part consisting of heavy deposits of sand and glacial clay. The rocks observed were of the Coppermine series. As the Hudson's Bay Company supply ship *Baychimo* was scheduled to arrive at Coppermine on August 8, it was not considered advisable to leave the vicinity of the post for more than twenty-four hours, so short trips east and west and to islands in the vicinity were undertaken. The coastal

areas and the islands, insofar as they were examined, corresponded geologically with the valley of the Coppermine river, but no encouraging mineralization was observed.

The *Baychimo* finally arrived on August 22, having been delayed two weeks by ice at a point west of Herschel island. Among those leaving the ship at Coppermine was R. D. Martin, M.D., who had been sent north as medical officer by the North West Territories and Yukon Branch of the Department of the Interior. He appeared to be well equipped with everything necessary to establish a medical post and was fortunate in securing a good building site fairly close to the point at which the supply ship anchored. The Hudson's Bay Company had detailed Mr. John Lickert, a very capable builder, to supervise the erection of Dr. Martin's quarters.

CHANGE OF ROUTE ON RETURN JOURNEY

After sailing from Coppermine, accompanied by Koodlookta, on August 23, visits were made to Wilmot island and the Hudson's Bay Company's post on Bathurst inlet; Cambridge Bay was reached on August 25. Here it was learned that the Hudson's Bay Company schooner *Fort James* was expected to arrive within a short time with the departmental schooner *Ptarmigan* in tow, and further that the company had been instructed by the Department of the Interior to deliver the *Ptarmigan* at Herschel island. It had been learned from Dr. Martin that it was the intention of the department that this boat would be turned over to him for use in his work. Shortly afterwards instructions were received by wireless from the department to take delivery of the *Ptarmigan* at Cambridge Bay and to arrange for its transfer to Dr. Martin at Coppermine. As wireless advices from the *Fort James* stated definitely that that boat would reach Cambridge Bay on September 3, everything belonging to our expedition was transferred to shore and arrangements were made to join the *Fort James* and to return to Ottawa by the eastern route.

The *Baychimo* sailed for Vancouver on September 1 and Koodlookta and I, by permission of Bishop Geddes, took up our quarters in the Anglican mission buildings on shore. Several wireless messages were received from the *Fort James* during the following week, none of which was altogether definite, but on the 10th word was received to the effect that the ship had abandoned the attempt to cross Queen Maud gulf and was heading eastward with the intention of returning to Newfoundland. Arrangements were then made to have Koodlookta taken to his home on King William island on board the motor schooner *Emma* of the Canalaska Company. This necessitated a change of program. However, within a few days word was received of the misadventure of the party headed by Colonel MacAlpine so it was decided to move to the depot of Dominion

Explorers Limited at Burnside river, where not only could assistance be given in the search which would certainly be initiated, but an opportunity of securing transportation to civilization might arise. Between Cambridge and Bathurst, visits were made to Byron bay (South Victoria island) and Wilmot island, and the Dominion Explorers' base was reached on September 23.

The Hudson's Bay Company's post on Bathurst inlet was reached under the good auspices of the Canalaska Company and its schooner, the *Nigalik*. At this point Colonel James Cornwall, who was in charge of the Dominion Explorers' Arctic activities in the Western Arctic, was met and the trip was continued on board the motor schooner *Polar Bear*.

Wireless advices received at Bathurst stated that two Western Canada Airways Limited 'planes were flying from the Mackenzie river to Bathurst and it was expected that they would arrive by September 24. These plans were altered, however, a group of five 'planes having been brought together at Baker Lake and it was not thought necessary to retain others in the search which was being undertaken for the missing party.

The weather on the coast was mild and very fine during the greater part of October but no 'planes appeared until the 27th, weather conditions on the height of land and minor mishaps having repeatedly delayed them.

From October 27 until November 5 each day upon which flying was possible was utilized in examining the various areas in which the missing 'planes might be found, but no results were obtained. The writer had the privilege during one of these flights of securing a wonderfully perfect view of the country from cape Barrow to Beechey lake, on Back river, the distance by the route flown during the day being approximately six hundred miles.

On November 5 word was received by wireless that the missing party were safe at Cambridge Bay. They had walked from Dease point, the place at which they had made an emergency landing, and found that they were without sufficient fuel to continue their flight. The reason for the long delay in proceeding to Cambridge Bay was that it was necessary to await the freezing of Dease strait before Victoria island could be reached. Three 'planes flew to Cambridge Bay on November 6 and returned with the party awaiting them at that point. Owing to an accident in landing at Burnside, one of the four 'planes that had arrived with the search party was under repair and it was not until November 12 that a start could be made for Winnipeg.

During the month spent at Bathurst inlet opportunities were offered to examine parts of the mineralized area extending from Wilmot island southward, the results of which are detailed in the latter part of this report.



5. (1) Coppermine husky dog. (2) Pack dog towing tent poles.

BY AIR TO WINNIPEG

The trip by air to Winnipeg was made in five stages. The first was from Burnside river to Muskox lake, at which point the 'planes were forced down by weather conditions at 1 p.m. on November 12. It was forty-eight hours before the trip could be resumed, a blizzard accounting for much of the delay and an accident to one of the 'planes in taking off for the final hour or two.

Two hours' flight from Muskox lake carried the party to old Fort Reliance where a successful landing was made and camp for the night was prepared. During the last hour of this trip a wonderful view of the caribou migration was afforded us. Over a distance of approximately one hundred miles the country was dotted with caribou, the limits of the herd extending east and west beyond our vision. Later, when travelling south-west from Reliance, a similar spectacle extended for fifty miles.

On November 15, the party was transferred by air to the Dominion Explorers' base eleven miles to the west. At the time of leaving Bathurst it was known that a delay would occur at Reliance as the ice was not yet firm enough at points south to carry 'planes using skis.

On November 30 two 'planes took one-half of the party from Reliance to Stony Rapids, a point eleven miles east of the east end of Athabaska lake, where the Dominion Explorers Limited has an aeroplane base and a fully equipped wireless station. The intended program was that these 'planes would return at once for the rest of the party, but, upon arrival at Stony Rapids, it was found that one of the passengers, who had had the misfortune to freeze his feet some time previously, was badly in need of medical attention. On December 1 one 'plane was sent on to The Pas where the invalid was placed in hospital. Two additional 'planes had been dispatched to Reliance, by way of Resolution, to bring out the remainder of the party.

Up to this date the larger stretches of Slave lake were still unfrozen, which condition resulted in much of the area between Reliance and Resolution being blanketed with fog which made flying most difficult. On December 2 Reliance lay under low clouds which rendered visibility practically nil but shortly after noon 'planes were heard circling overhead. Every effort was made to attract the attention of their pilots but although the 'planes were at times visible from the ground, the pilots were unable to locate the depot. After circling for an hour over the area in which they knew the depot to be they dropped down at old Fort Reliance and spent the night in an abandoned cabin. After dark large brush fires were lighted at the depot, which were seen by the crews of the 'planes, giving them the exact course to the depot. Late next forenoon both 'planes

landed at the camp and as it would not be possible to reach Stony Rapids that day before the light failed, arrangements were made for an early start next morning.

On December 3 flying conditions were not promising. One 'plane went up to observe conditions above the clouds but reported no visibility to the south, so another day was spent at the depot.

Next morning both 'planes were loaded and left the ground at ten o'clock. For an hour the visibility was good and an excellent view was obtained of the country along the Snowdrift river. Large herds of caribou were seen during the first fifty miles of the flight but none was noticed after the Snowdrift river had been crossed. Shortly after eleven o'clock heavy cloud banks lay across the course and here the 'planes became separated, one climbing above the clouds while the other dropped low enough to get an occasional glimpse of the earth. Athabaska lake was first seen west of Black bay, at which point the course was changed to about due east. A snowstorm developed about noon and continued until the end of the journey. The first 'plane landed at Stony Rapids at 1.15 p.m. and was followed by the second, thirty minutes later. One of the 'planes which had left Burnside river nearly four weeks before, was still waiting at the wireless station here when the last of the party reached this point.

On the morning of the 5th preparations were made for an early start with The Pas, Manitoba, as the next objective. The weather was clear and cold, the temperature being 27 degrees below zero, but flying conditions appeared to be excellent. Just as the 'planes were ready to take off, a slight change in the wind drifted a bank of fog (which rose from the open water at the rapids), across the flying field, delaying the start until noon. The 'planes then rose singly and, as each was slow in getting away, they saw nothing of one another during the day. Only the first 'plane to leave reached The Pas that evening. The second spent the night at Cranberry Portage while the last, on which the writer was a passenger, camped at Pelican Narrows, an interesting fur-trade centre in northern Saskatchewan, where the personnel were entertained by an independent trader, Mr. Jan, and his wife.

Next morning, December 6, we left at daybreak and upon arrival at Cranberry Portage forty minutes later, found the 'plane which had spent the night there just ready to leave for Winnipeg. During this flight the 'plane passed over the Flin Flon mine. After refuelling, the trip was continued to Winnipeg, the course followed passing over The Pas, where the third 'plane was seen to be still on the ground. All three 'planes landed safely at Winnipeg during the early afternoon and the trip from the far north was over.



6. In the Coppermine valley. (1) Clay hills, 300 feet high, near Bloody Falls. (2) Glacial drift with copper nugget on top, Husky creek. (3) Foot of Bloody Falls. (4) Fish house.

PREPARATIONS AND SAFEGUARDS FOR NORTHERN TRAVEL

In the foregoing pages travel by schooner, dog team and aeroplane has been dealt with. Possibly something may here be said concerning the preparations and safeguards for such travel.

Coastal Travel by Schooner.—Coastal travel by schooner will be dealt with first. For this work a schooner not less than forty feet in length, heavily timbered and, preferably, sheeted with metal or iron bark, should be used. Anchors of greater weight than would ordinarily be used for the tonnage of the boat, together with ample lengths of anchor chains, should be provided, as much of the coast is but poor holding ground with little or no shelter. Spare anchors should be carried as experience has taught that during a season's operation, when ice conditions are even normal, one or more anchors will have to be sacrificed.

As the coastal waters are almost uniformly shallow even a comparatively light draft schooner cannot approach the shore closely, and at least one fairly heavy line, one thousand feet or more in length, should be provided. The schooner should be so rigged and loaded that it will lie hove to without too much handling. During almost any season a trip along the length of the northern coastline will necessitate the riding out of at least one blow. As the harbours are few and far between it is unsafe to count on running to shelter when the blow comes up.

All of the schooners operating along the northwestern coast are fitted with auxiliary power, internal combustion engines, of course, being used. With regard to this phase of the problem, care should be taken to have enough power to ensure headway against heavy winds and through medium ice floes. The schooner should be well equipped with spare engine parts and a full supply of repair material and tools. Soft lead sheeting for patches, copper nails, spare canvas, paint, white lead, spare planking, oak strips for reinforcing broken frames and cotton for caulking, should not be overlooked. A schooner equipped as above and handled by a man of experience in coastal waters should meet the requirements of a trip along the Arctic coast. If the trip is to be continued east of Coronation gulf a set of sun compass charts will be found to be most useful as the ship's compass will then be quite useless.

Should an Arctic coasting trip be contemplated when no schooner measuring up to the above specifications as to size, weight and equipment is available, the best alternative will be a standard whale boat, preferably fitted with both sail and light auxiliary power. If the trip is undertaken with this equipment many of the difficult situations in which a heavier schooner might find itself could be met, by hauling the smaller boat up on an ice pan, or on the shore. To travel by whale boat, however, would mean a great loss of time as many of the wider inlets would have to be

followed to their foot. Only under extraordinarily favourable conditions could a round trip from the Mackenzie delta to Coronation gulf and return be made during one season by the use of a whale boat. Coronation gulf could not be reached in time to do any considerable amount of work during the first summer.

While the various charts available are good insofar as the principal oceanographic and coastal features are concerned, they must not be relied upon absolutely as along the whole trip much coastal detail as shown on the charts is inaccurate and, as the soundings and dangerous shallows indicated are few and cover only the courses followed by a very limited number of vessels, all navigators of these waters must be ever on the lookout for uncharted dangers.

Travel on Land or Ice by Dog Sled.—The first essentials for this method of travel are, naturally, good sleds and suitable dogs. The sleds at present in use and which to-day appear to be the most satisfactory are of two types. The native sled or komatik is built from two planks of any strong but not too heavy wood. British Columbia fir is much favoured, although good northern spruce is also used. These planks should be fourteen to sixteen feet long, ten to twelve inches wide and two and one-half inches thick. In setting up the sled the planks are shaped as an ordinary sled runner and wooden bars lashed across them, making a sled approximately seventeen inches between the runners and with a deck about twenty-five inches wide. The front of the runners should be shaped with a gradual curve about forty inches in length, with a further very slight curve to include the rest of the runner until a point within eight inches of the back is reached, when a sharper curve will bring the bottom of the runner at least five inches above the ground. The low point of the sled should be just in front of its centre. The runner at its front should have more material added to its top to permit of the upward curve being carried to a point not less than sixteen inches above the ground. The lashing should be thoroughly and strongly done. Anyone unacquainted with the proper method of lashing should take advice from someone who understands it. In no event should nails or screws be used in any part of the sled other than in securing the iron or bone shoeing with which the runners should be fitted. The shoeing is best made of whale bone (with spring steel a second choice) of the same width as the wooden runner. It should be just heavy enough to prevent kinking. The proper thickness will depend somewhat upon the quality of steel but, with good material, $\frac{3}{16}$ -inch should suffice.

The second type of sled favoured is the Nome or basket sled. This sled is built of light hardwood strips and is put together by a system of mortices and tenons in a rather involved way that cannot be described



7. Bathurst Inlet. (1) Hudson's Bay Company post. (2) Quartz dyke. (3) Basaltic hill.

without the use of drawings. A bill of material necessary to construct one of these sleds will be added to this report as an appendix and anyone accustomed to working in wood, if supplied with an ordinary outfit of tools will find it possible to set up the sled by examining samples in use along the coast.

Dogs suitable for work along the coast must be secured in the north. The prices asked for them will vary greatly—the merits of the dog and the point at which it is purchased both entering into the question. Roughly, it may be said that good dogs may be secured either at the eastern or western entrances to the Canadian Arctic, with the grade of dogs depreciating as the central areas are approached. The prices asked on the Labrador coast and in the more eastern areas, where dogs may be bought for five dollars each, are very much less than in the west, as there high class dogs command one hundred dollars and upwards. The eastern dogs are in no way inferior to the western, the variation in price being accounted for by the relative difference in the price of all commodities in the two areas and by the fact that dog feed in the east is secured from the by-products of the cod fishing industry.

The most satisfactory harnesses can be made locally, as those manufactured in civilization will be no better in design and will labour under the disadvantage of having been made without definite information as to the size of the dogs that will wear them. A supply of soft harness webbing $1\frac{1}{2}$ inches wide should be provided before leaving civilization, also needles and a supply of thread and wax for making waxed ends. In estimating the amount of webbing necessary, allow seventeen feet for each dog and be prepared to make several more harnesses than will outfit the proposed team.

One of the most difficult problems connected with winter travel is the supply of sufficient and suitable feed for the dogs. If a boat with capacity to carry all essentials is available, the question can be most easily answered by purchasing a supply of dried fish or meat, or both, before leaving the Pacific or Atlantic coasts. If good oily fish is available an allowance of one and one-quarter pounds a day for each dog while not working, with two pounds a day provided during the winter or working months, will be sufficient. If the fish or meat is dry or with little fat, one and one-half pounds a week of tallow for each dog should also be taken. With an ample supply of dog feed imported from outside the best possible results will be obtained as radical changes of diet almost invariably impair the efficiency of the team. Should it be impossible to carry dog feed into the country the traveller will be well advised to accumulate dog feed at every opportunity which may present itself within the north country. In very few localities will the local supply meet the needs of the dog teams that will call upon it.

Selection of Clothing Suitable for Use During Winter Travel.—A fair supply of heavy underwear, sweaters or woollen windbreakers; good canvas overalls, woollen socks and a supply (ten yards) of medium weight drill or ticking should be taken north, also at least one dressed sheep skin with the wool still on it, to be used for boot soles. The drill will later be made into snow shirts or *parkas* and the whole outfit augmented when the North is reached by a supply of caribou skin *parkas*, trousers, boots, mittens and socks.

These may be obtained from the local natives if the caribou skins are available. When entering the country every effort should be made to purchase either dressed or undressed caribou skins as at many points the local supply will not meet the demand while at other places they may be plentiful. Dressed reindeer skins with the hair on them make excellent clothing and are easily obtainable along the Alaskan coast. The light or medium weight skins make much the best clothing. Caribou skins will also be needed for a sleeping bag and for spreading on the snow to make a bed. Fourteen fair sized skins will be ample to cover the needs of one man. In addition to the above, an eiderdown sleeping robe will be of great use.

Under the present conditions it is reasonably safe to look to the Canadian Arctic coast for enough caribou skins to supply everyone but should the white population be greatly increased the demand will not be met. To be absolutely safe a supply of western reindeer skins should be secured. These may be either dressed or undressed as the local natives are experts in their preparation.

Camp Outfit.—A travelling camp outfit is comparatively simple but differs in every way from one carried in a timbered country. For fall and spring travel a tent may be used but during the winter months (from mid-November until late in May) a snow house is infinitely more satisfactory. At least two primus stoves should be carried on each expedition as while some makes are fairly reliable the best are liable to accident or failure from some other cause. The single burner primus stove supplied with extra generators and nipples, has been most successfully used for many years. The fuel—coal oil—necessary to support a travelling party will depend somewhat on the number of the party and the amount and kind of cooking to be undertaken, but three pints a day for each camp, which may be raised to four pints should the party exceed five in number, will be ample.

Each sled should carry at least two snow knives (butcher knives with ten- or twelve-inch blades), a light hand axe, wire drying rack, files, a supply of light cordage for sled lashings and extra dog traces, a repair outfit for harness, a coal oil lantern, one snow shovel and a supply of



8. Views of copper-bearing hills, Bathurst inlet.

candles. An electric flash light is also most useful but a good supply of batteries must accompany it as the extreme cold affects them quickly.

Overloading with guns and ammunition should be avoided as they will be little used, but one rifle and a limited supply of ammunition should be provided. While the type of rifle carried is a matter of choice it may be remarked that 30-30 ammunition is obtainable at every trade store. An ice chisel, fitted with a short shaft, is quite often of use.

The supply of cooking utensils and dishes should be reduced to a minimum but one fairly large kettle to be used for melting snow is essential. The load on the sled will be greatly lightened if a supply of dried fish or meat has been provided for dog feed. It is not practicable to cook the feed in a snow house, so the only alternative to dried dog feed is fresh meat or fresh fish, both of which will be very heavy, and troublesome to handle.

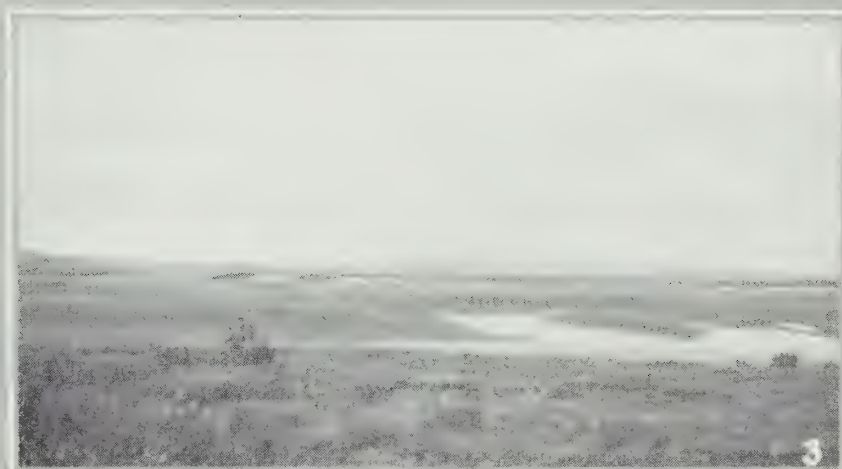
The rations carried for the personnel of the party should consist of essential staples with not too much variety and which can be quickly prepared. Rolled oats, rice, beans which have been cooked and frozen before the trip is undertaken, tea, coffee, sugar, pilot bread and cooked bacon complete the average outfit. To this a short ration of jam may be added and a limited supply of butter and condensed milk which should be looked upon as an emergency ration.

Headquarters Camp.—The headquarters winter camp will necessarily depend greatly upon the character of the party and the transport available when entering the country. If the transport permits, a lumber and building-paper house designed to accommodate the party and their work will be used, but for a lighter outfit, a double tent of heavy canvas with lumber sufficient to erect a frame strong enough to carry a considerable weight of snow (with which the tent will be covered) should be provided, and also a double glazed window and material for a floor, door, tables, benches and bunks.

The smaller camps of either type can easily be heated by a small cooking stove which can be fuelled for the winter by from two and one-half to five tons of selected coal. For lighting a camp, gasolene lamps are much in favour but coal oil lamps or candles will suffice.

In planning a winter camp do not be niggardly in estimating the necessary supply of building paper as it will give value out of all proportion to its weight. Protectors to pass stovepipe through the walls and roof are very necessary.

A light outfit of tools should be part of every outfit and should contain at least the following: cross-cut saw, rip-saw, ice-saw, hack-saw (with plenty of blades), brace, bits (up to one-inch), drills (up to one-half inch), bench axe, hammer, files (assorted), set of chisels, solder outfit with flux, and a two-foot rule.



9. At Burnside River. (1) Plane through the ice. (2, 4, and 5) Views of Dominion Explorers' base. (3) Delta Burnside river. (Note sand flats which afford good landing for aeroplanes.)

The expendable building supply will consist of nails, screws, carriage bolts (assorted), wire (copper and stovepipe), solder, copper rivets and of course other special supplies that may be called for by the type of work to be undertaken by the party.

Double cod lines, light cotton line and half-inch manilla rope will cover the essential cordage.

The headquarters food ration supply will depend upon the taste of the party using it, but it should be long on sugar, tea, milk, jam and fats.

Travel by Air.—If a trip by aeroplane is to be undertaken the detail of the types of 'plane to be used, routes to be followed and mechanical and camp equipment to be provided can best be decided by the commercial air transport companies and their pilots, who have had experience in northern Canada. The prospective passenger should provide himself with warm clothing and footwear suitable both for cold and inclement weather and, should misfortune overtake the expedition, also suitable for a more or less extended trip on foot across a country where the footing will vary from rough and rocky highlands to low and, quite frequently, marshy flats.

Don't.—In conclusion a few "don'ts" may be suggested: Don't go north expecting to purchase any essential part of your outfit locally. While the trade stores carry a very complete line of necessary supplies, an inconsiderable increase in the population at any point will soon deplete their stocks.

Don't form your opinion of the Arctic climate and its dangers too quickly. The Arctic climate is generally kindly, but when it shows its teeth anyone caught unprepared is in more than ordinary danger.

Don't go more than three miles from a winter camp unaccompanied by a native or by a white man of long experience. The Arctic storms come quickly and the weather on the most innocent day may change within one hour to conditions which have before proved and may again prove deadly.

Lastly: Don't go to the Arctic without a definite objective. Anyone undertaking the trip in the hope that the activities of others may make an opening which he can use to advantage, will, in all probability, meet with disappointment.

SUMMARY OF RESULTS OF MINERAL INVESTIGATION

When reaching Coronation gulf in June, 1929, the writer was quite without information concerning the occurrences of copper in this region other than a somewhat hazy recollection of reports read several years before. The line of action decided upon in making the examination of mineralized areas was to secure from the local Eskimos the position of all points at which they had found native copper or had seen the green stains indicative of the presence of copper in some form.

Natives met at Wilmot island were familiar with both the Coppermine and Bathurst inlet areas and from them much information was secured. None of them reported any signs of copper between Kugaryuak river and cape Barrow but all agreed on various points in the valley of the Coppermine river and on the western mainland and adjoining islands of the north end of Bathurst inlet. Other natives met with during the summer only corroborated the information secured at Wilmot island, none having new locations to suggest.

Many of the islands both north and south of Wilmot island showed native copper in place and, from one, a good specimen of chalcopyrite was secured. In the Bathurst area by far the greater percentage of native copper occurs finely distributed through massive basaltic rocks, the copper particles becoming heavier in what would appear to be the more rapidly cooled sections of the flows. Copper particles are not always found throughout the basalts of this area but are of very frequent occurrence. In places, narrow veins of copper were seen in these basalts, some of which could be traced for several feet, but nowhere were these veins seen in sufficient numbers to suggest that the copper they carried would warrant the mining of any considerable block of ore. The value of the rock carrying finely disseminated native copper could not be approximated in the field but by reference to Dr. J. J. O'Neill's report (see Vol. XI, *Canadian Arctic Expedition 1913-18*, Department of Mines, Ottawa), it is learned that these masses prove to be quite low grade. The only sample of chalcopyrite seen was found on an island lying about five miles north and slightly east of Wilmot island. This was, incidentally, the most northerly trace of copper found in this area.

On the eastern side of Banks peninsula is one of the largest individual areas showing copper in place. Along this shore line the natives report that some years since a large copper nugget was to be seen embedded in the face of a cliff. They stated that it was their practice to visit this nugget and cut pieces off for their various uses. Later this nugget became displaced and fell to the level ground below where it has since been buried by talus.

The Bathurst Inlet area that appears to be worth investigation extends from five miles north of Wilmot island to a point near the south end of Goulburn island (note: Goulburn "island" is in reality a peninsula). The east and west extensions of this area were not fully determined but it will include the western coast line of Bathurst inlet, the islands opposite and the islands north of Kater point.

To sum up the possibilities of this area: nothing to suggest a "ready made" mine was seen but the extent of copper-bearing rocks is very great. Copper seen in the drift to the westward and also that reported by the natives as having been found in this area indicate a location or



10. Planes on Muskox lake, November 14, 1929.

locations where the copper occurs in much greater abundance and in more massive bodies than have yet been seen by white men. In my opinion this area is well worth systematic investigation by competent prospectors. (Note: for the general geology of this area, see Vol. XI, *Canadian Arctic Expedition, 1913-18*.)

The only other area, calling for examination, that the information received from the natives suggested was the valley of the lower Coppermine. The native knowledge of copper occurrences in that section appeared to be confined to two locations in which massive copper was to be seen in the glacial drift. Both occurred in low mounds rising from meadowlands in the broad valley of a small stream which joins the Coppermine about twenty miles south of Bloody falls, one deposit lying about five miles west of the river and the second seven miles still farther westward. Neither would appear to have any economic value in itself but both indicate a source of copper within the area at large. Prospecting operations in this area would call for the backward tracing of the glacial flow to the source of copper and would be the work of a geologist rather than a prospector. Doctor August Sandberg, who visited the valley of the Coppermine in company with Doctor James Douglas, in 1911, made a reconnaissance of the valley of the Coppermine to the south and west of the areas just described. His report, which is reprinted in Vol. XI, *Canadian Arctic Expedition, 1913-18*, is most interesting but would not appear to rank the district covered as likely a prospecting field as the Bathurst inlet area.

NOTES ON NATURAL RESOURCES AFFECTING MINERAL DEVELOPMENT

The country south of Coronation gulf and west of Bathurst inlet is well served by rivers of considerable size. The chief among these are the Rae, Coppermine, Tree, Hood and Burnside. All of these rivers are similar in type. They have their sources on the height of land to the south from whence they flow across a series of plateaus with rapids marking the fall from one general elevation to the next, until points within a few miles of the salt water are reached. Here, each river makes its big drop to the sea and on each, where it cataracts over the last barrier before reaching the sea, a good head of water can be obtained and large storage basins can be developed immediately above the head of the falls. In the Coppermine and, possibly, the Tree river, the winter flow is of sufficient volume to ensure enough power for any operations that are likely to be undertaken for some time to come.

Sand and gravel for general building purposes are available, as is an ample supply of rock for roads or railways. Fresh meat and fish appear to be in some abundance and the supply necessary for a small industrial



11. Country near Reliance. (Upper) Aerial view from an altitude of 4,000 feet.
(Lower) A closer view.

community could be obtained without injury to the herds of caribou or the local fisheries.

On the negative side of the account lie fuel, lumber and an ensured water supply. The first two of the above, fuel and lumber, are, from an economic standpoint, non-existent in the area itself, but low grade coal might be brought from the known deposits on the southern coast of Banks island. The assurance of a winter water supply for an industry of any magnitude at any point far removed from one of the larger rivers is at least in some doubt as it is a question just how far water can be piped during the winter weather.

NOTES ON LAND, SEA AND AIR TRANSPORTATION

Up to the present year it was necessary to use one of two routes to deliver either passengers or freight to this district: the first by ship from Vancouver or other Pacific port, to Coronation gulf *via* Bering sea; the second by river boat from Waterways on the Athabaska river to Aklavik and thence by the sea route to Coronation gulf. The rates on both of these routes are more than any ordinary industrial enterprise can pay and there is considerable danger of a partial or total loss of goods shipped on either route. As transportation systems to support mining activities, neither can be considered. The country is not without harbours but in none of them has it been possible to land freight from ship to shore direct.

There are three alternative routes to those in use now in sight: the first would result from extending the Hudson Bay water route to the western end of Baker lake and from thence to Bathurst inlet by rail, which calls for railroad construction between points 350 miles apart in a direct line. The second would be an extension of the Hudson Bay railway from Churchill to Bathurst inlet, which involves railroad construction between points 800 miles apart (in an air line). The third is the extension of the Northern Alberta Railway (formerly known as the Alberta and Great Waterways Railway) from Waterways to some point on Coronation gulf. This involves railroad construction between points separated by 850 miles.

It would appear that the Baker Lake route is the least expensive in regard to construction but it would be at best a five months per year route. The Churchill route would cost less to construct than the extension from the Waterways and would lead more directly to smelting and refining centres. The Waterways route, while possibly the most expensive to construct, has to its credit other likely mineral areas along its route which may well be expected to bear their share of the costs of construction and operation.

During 1929 aeroplanes showed that they were a factor in the transportation problem of the Far North and although their first season was not without its mishaps it had already been demonstrated that for light



12. At Reliance. (1 and 2) Views in the harbour. (Note curling rink to the right.) (3) Dominion Explorers' base. (4) The author, as he reached the first timber, November 14, 1929.

passenger service they are far in the lead. The more northerly basic points for air travel are Baker Lake and Reliance. The first would have a southern connection from Churchill, while Reliance would be fed from The Pas, Prince Albert and Edmonton. The terrain over which all of these routes lie is wonderfully adapted to either summer or winter flying, but all must surmount the barrier which lies along the height of land between the Arctic and the more southerly waters. Here an eternal conflict is waged between the Arctic and sub-Arctic climates, the resulting conditions being low visibility, ground fog and low-lying clouds, to which must be added sudden and violent storms, all of which tend to cause delay and add to the hazard of air travel.

The Coronation area is well served by lakes and inlets which afford safe landings for 'planes either in summer or winter and good anchorages during the open season. Just what success 'planes will meet with in attempting to fly over the untimbered country in the Arctic slope during the winter months is still somewhat of a question as the only experience so far gained along these lines is from a limited amount of flying done by exploration companies in and around the Baker Lake area during the past season. The mid-winter handicaps that flying in these areas will carry are: lack of visibility, ground drifts, fogs and landing grounds upon which the drifted snow will constitute a real hazard.

Passing reference has already been made to mineralization areas lying along a possible extension of the Northern Alberta Railway to Coronation gulf. These would naturally bear their share of transportation expenses. Already very active prospecting operations have been carried on in the area around the eastern end of lake Athabaska. On one location these operations have already reached the drilling stage. Prospectors have met with encouragement at points along this route as far north as Reliance, which divides the unbuilt section of this route into three almost equal divisions, each with a mineralized area which may carry its own transportation costs. At no point other than in the Coronation Gulf district has a mineralized area of promise been found, north of a line between Stony rapids and Eskimo point. This would indicate that Coronation gulf cannot as yet count on other areas assisting in the cost of possible transportation routes *via* either Baker lake or Churchill.

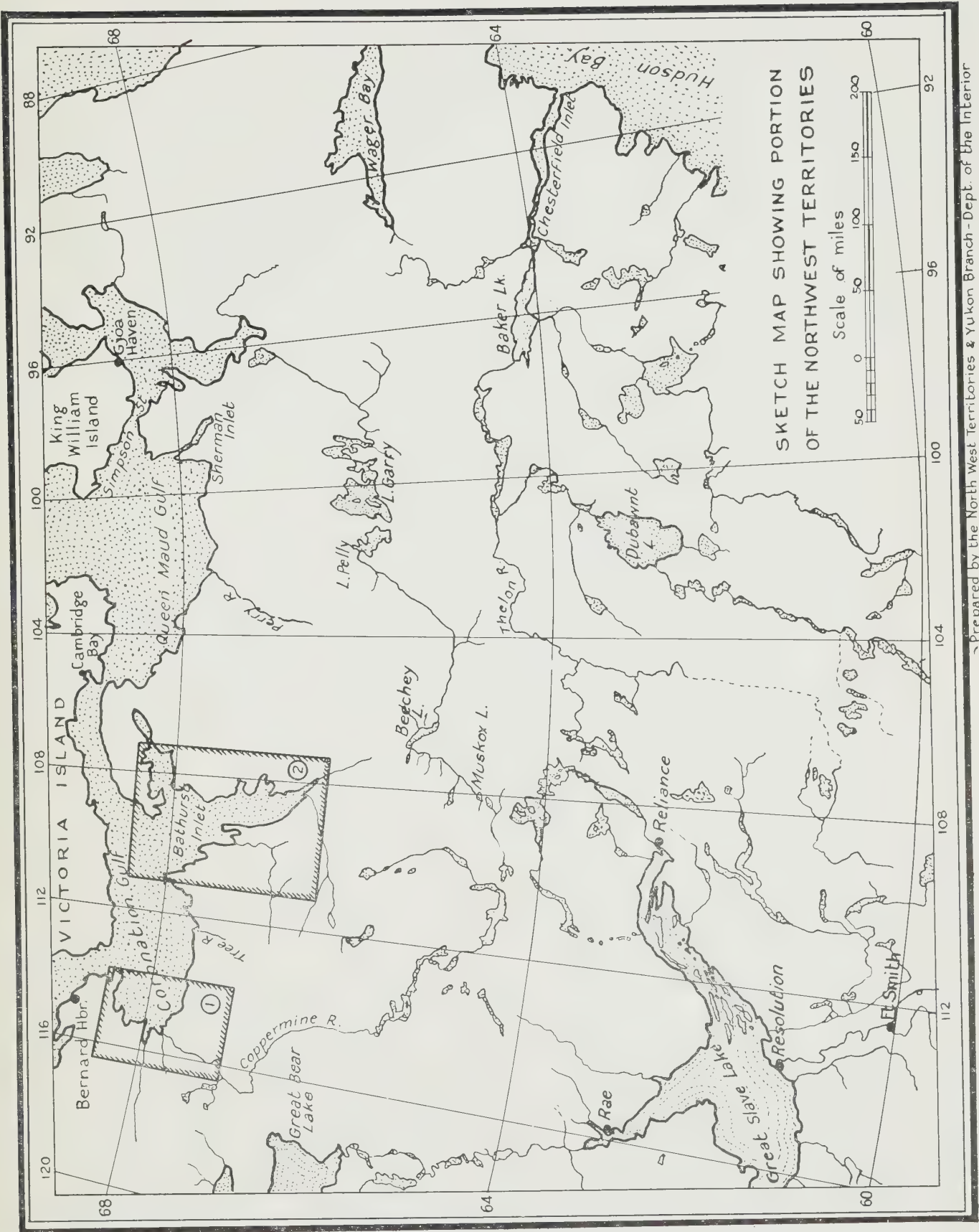
CASUAL LABOUR

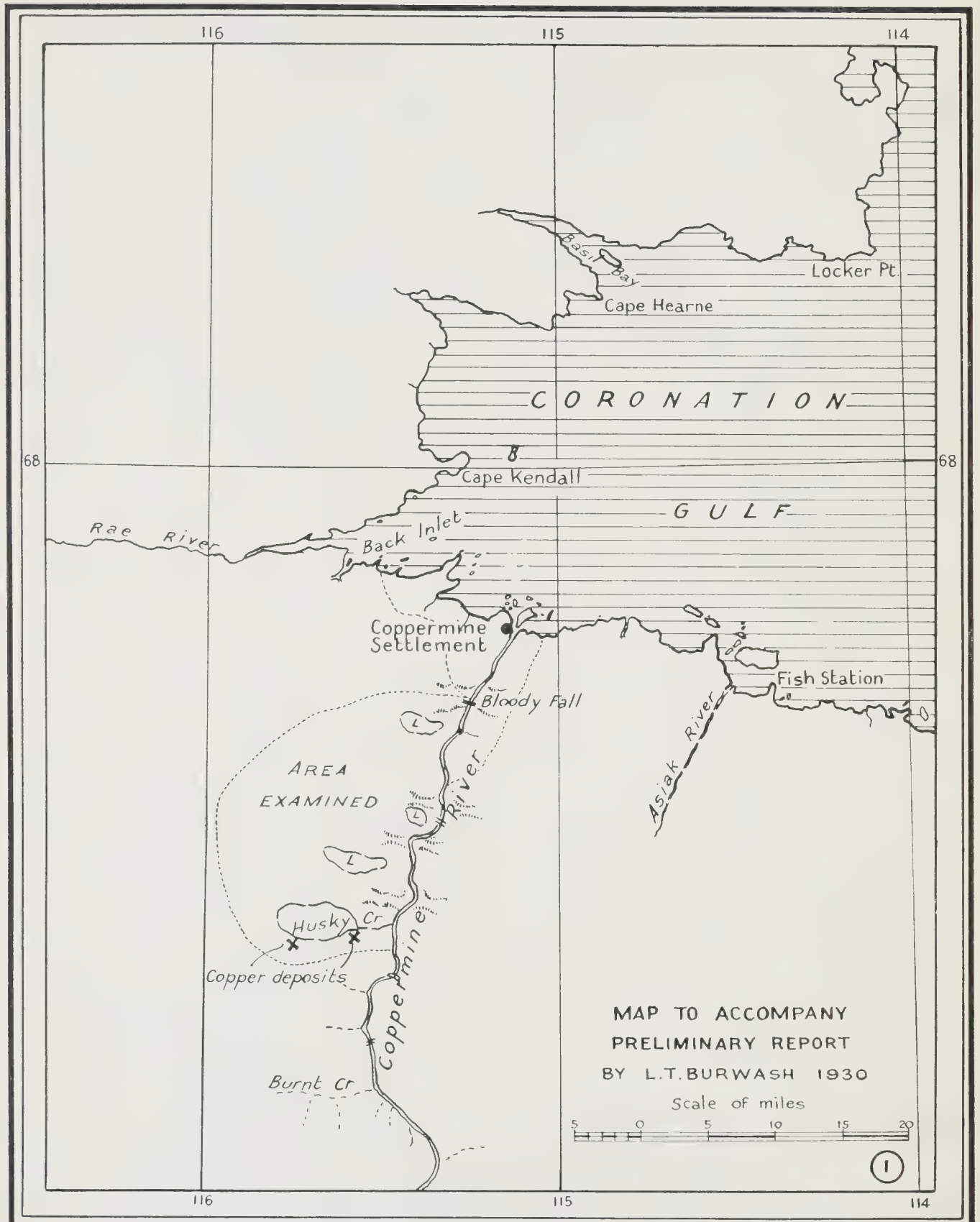
No white casual labour is in the market. The local Eskimos would do much to assist in the manual labour necessary to develop mineral wealth but it should be borne in mind that Eskimos so employed during the summer months only, unless they were well paid and their wages expended to the best advantage, would enter their long winter season under a decided handicap as they would be without fur clothing, caribou meat or fish.

APPENDIX

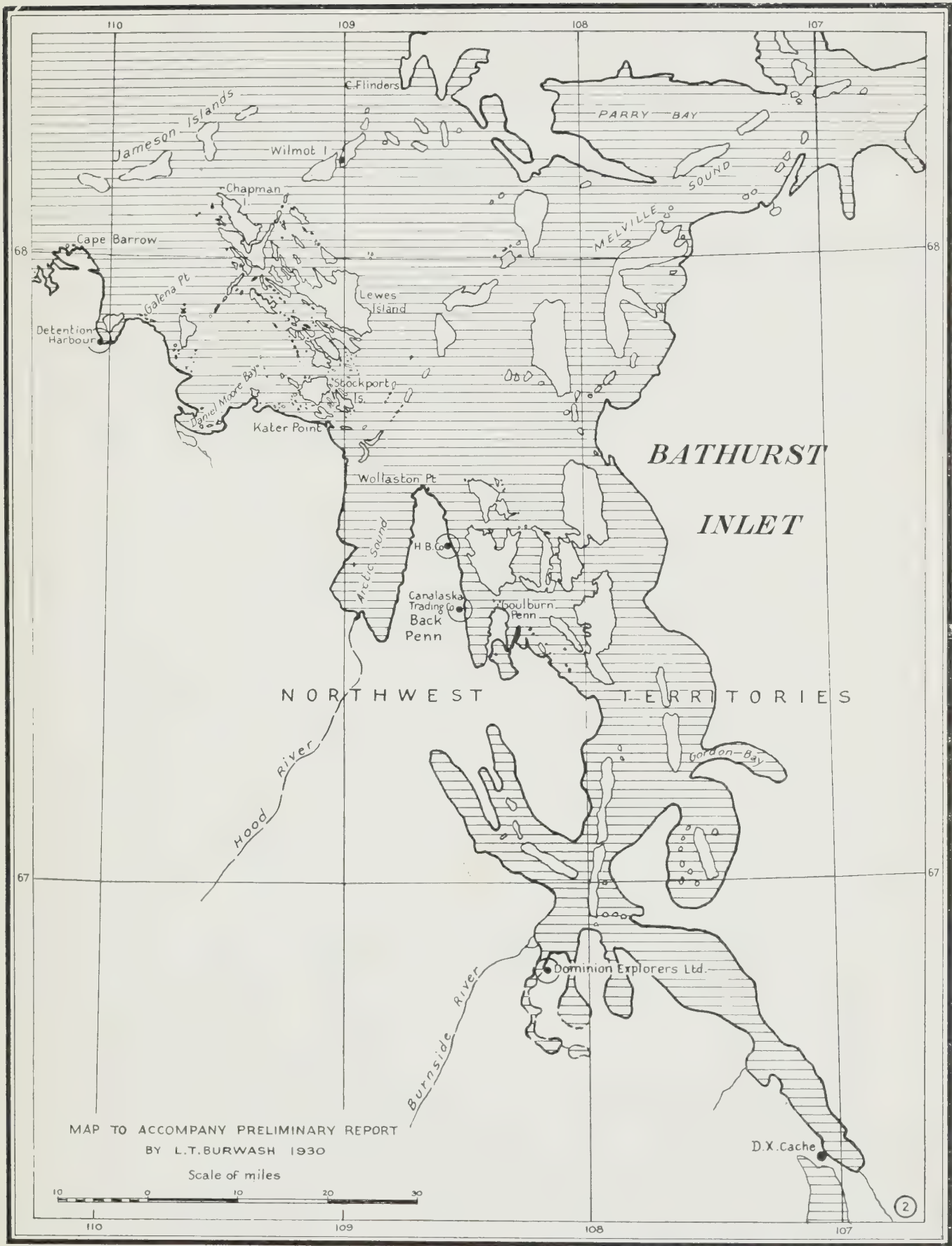
BILL OF MATERIAL FOR ONE BASKET SLED

| | | | | | | | | | | |
|---|------------|---|--|-------------------|-----|-----|------------------------------------|---|---|---|
| 3 | pieces | 1 " | x | 2 " | x | 16' | first-grade, second-growth hickory | | | |
| 2 | " | 1 $\frac{1}{4}$ " | x | 1 $\frac{1}{2}$ " | x | 16' | " | " | " | " |
| 2 | " | $\frac{1}{2}$ " | x | 3 " | x | 16' | " | " | " | " |
| 5 | " | $\frac{1}{2}$ " | x | 1 $\frac{1}{2}$ " | x | 16' | " | " | " | " |
| 2 | " | $\frac{3}{4}$ " | x | $\frac{3}{4}$ " | x | 16' | " | " | " | " |
| 1 | " | 4 " | x | 3 " | x | 30" | " | " | " | " |
| 1 | pair | spring-steel sleigh shoes | $\frac{1}{8}$ " | x | 16' | | | | | |
| 1 | gross | $\frac{3}{16}$ " x 1 $\frac{1}{2}$ " | fluted sleigh-shoe bolts with washers. | | | | | | | |
| 5 | pounds | cowhide babiche. | | | | | | | | |
| 3 | ringbolts, | 1" ring, $\frac{3}{16}$ " diameter, 2" bolt, with nuts and washers. | | | | | | | | |





Prepared by the North West Territories & Yukon Branch - Dept. of the Interior
Sketch map of lower Coppermine valley.



Sketch map of Bathurst inlet.

